

1 VQE results Aer Estimator (With Shots)

| (Full Hamiltonian) | | | | | Double Well | $\Lambda = 32$ | COYBLA Max 10k Iterations | | | | |
|--------------------|-----------|-------|----------------|-----------|-------------|----------------|---------------------------|---------------|-------------------|------------|-------------|
| Ansatz | Tolerance | Shots | Converged runs | Mean iter | VQE min E. | σ_{min} | Δ_{min} | VQE median E. | Δ_{median} | Exact | Time |
| RA r1 r1 | 1e-01 | 10000 | 100/100 | 58 | 5.8476e+00 | 2.7646e+00 | 4.9559e+00 | 1.9953e+01 | 1.9061e+01 | 8.9163e-01 | 05h 05m 35s |
| RA r1 r1 | 1e-02 | 10000 | 100/100 | 81 | 3.1508e+00 | 2.8325e+00 | 2.2592e+00 | 2.1958e+01 | 2.1067e+01 | - | 06h 29m 48s |
| RA r1 r1 | 1e-03 | 10000 | 100/100 | 99 | 7.6653e+00 | 2.9698e+00 | 6.7737e+00 | 2.0868e+01 | 1.9976e+01 | - | 06h 42m 44s |
| RA r1 r1 | 1e-04 | 10000 | 100/100 | 123 | 2.4498e+00 | 2.9861e+00 | 1.5582e+00 | 1.9769e+01 | 1.8878e+01 | - | 08h 40m 38s |
| RA r1 r1 | 1e-05 | 10000 | 100/100 | 142 | 3.0637e+00 | 3.3472e+00 | 2.172e+00 | 2.2497e+01 | 2.1606e+01 | - | 09h 25m 57s |
| RA r1 r1 | 1e-06 | 10000 | 100/100 | 159 | 3.3185e+00 | 3.3285e+00 | 2.4269e+00 | 1.8597e+01 | 1.7706e+01 | - | 11h 20m 34s |
| RA r1 r1 | 1e-07 | 10000 | 100/100 | 183 | 7.8031e-01 | 3.3655e+00 | -1.1132e-01 | 1.9159e+01 | 1.8268e+01 | - | 12h 07m 58s |
| RA r1 r1 | 1e-08 | 10000 | 100/100 | 200 | 2.9957e+00 | 3.2842e+00 | 2.1041e+00 | 1.5275e+01 | 1.4384e+01 | - | 13h 33m 11s |
| Ansatz | Tolerance | Shots | Converged runs | Mean iter | VQE min E. | σ_{min} | Δ_{min} | VQE median E. | Δ_{median} | Exact | Time |

Table 1